

ISR RUNNING-INRun 64; 7.6.1971; Ring 1; 22 GeV/c; 20 bunches.

PS : Q-jump and reduced RF voltage

Injection at - 36 mm

Working line : FS 22 with c.o. correction

Clearing voltage : + 3/0 kV

RF program : stacking at the bottom

first pulse stacked at + 30 mm from c.o.

10 mm displacement at 1.6 kV

2 cavities running, the others switched off and short-circuited.

Experiment 1

Stacking with clearing electrodes (c.e.) went very smoothly with practically no losses up to 5.3 A within 73 pulses, at this current an injected pulse triggered BW, and the current dropped to 3.9 A, (Fig. 1).
Loss rate at 3.9 A : $\frac{1}{2} \times 10^{-2} \text{ min}^{-1}$.

After 2 minutes 1.2 A were added, giving 4.9 A at 98 pulses total. Again fast loss was observed, to 4.1 A. Loss rate at 4.09 A : $1.8 \times 10^{-3} \text{ min}^{-1}$.

After 6 minutes an attempt was made to add more current. This caused a loss of 1 A, and the experiment was stopped. At the end the c.e. in Octant 7 were found to be off, this makes this experiment rather inconclusive. The pressure in VG 665 reached more than 10^{-8} torr in exact correspondence with the current peaks.

Experiment 2 : dust particles in the beam ?

Stacking without c.e. saturated at 4.2 A. Without c.e. the beam is supposed to be neutralised and therefore to have no potential to

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attract dust. The earlier saturation compared to Exp. 1 shows that there is no dust. Some BW output after each injection. Loss rate at 2.2 A : $1.3 \times 10^{-2} \text{ min}^{-1}$. Pressure at VG 665 : 2×10^{-9} torr at 4.2 A.

Effect of running RF, inflector, shutter and scrapers
from simulated pulses

Experiment 3

Stack to 4.2 A, stop injection and start simulated pulses, plateau for $\frac{1}{2}$ minute, then decay to 3.9 A. During the decay the RF was running and made small current steps, (Fig. 2). Signals on the BW scopes were not very different from normal injection signals, but this needs further checking (sensitivity etc.).

Experiment 4

Stack again to 4.2 A, plateau for $\frac{1}{2}$ minute, decay to 3.9 A, all this without injection simulation. After 5 minutes simulation was started; the RF then gave stepwise losses of 6.5 mA/pulse, (Fig. 3). BW output was also seen. Stacking at the bottom increases the distance of the bucket from the stack as time goes by, and should reduce the effect.

Maximum current and beam size vs. current with 4 bunches

Experiment 5

Stacked to saturation at 1.64 A, with some antistacking, (Fig. 4), RF scan 1.

Experiment 6

Stack to 0.2, 0.4, 0.6, 1.0 A, RF scans and beam probe scans. Horizontal beam probe scan useless because in far tail, vertical beam probe O.K. but not very interesting.

0.1948 A : RF scan 2
Vertical beam size : - 16.4 to 11.9 mm

0.3969 A : RF scan 3
Vertical beam size : - 16.5 to 12.5 mm

0.5947 A : RF scan 4
Vertical beam size : - 16.6 to 12.0 mm

0.9928 A : RF scan 5
Vertical beam size : - 17.3 to 12.8 mm

Experiment 7

Simulation was switched on with this stack, no effect was observed, not even on the BW scopes.

Beam size vs. current with 20 bunches

Experiment 8

0.9797 A : RF scan 6
Vertical beam size : - 17.8 to 13.2 mm

2.0190 A : RF scan 7
Vertical beam size : - 17.5 to 13.6 mm

4.0507 A : RF scan 8
Vertical beam size : - 17.9 to 13.7 mm

Adding current to this stack gave 4.6 A with rapid decay to 4.0 A which even at this level was less stable than the 4.0 A stack before the addition. RF scan 9 shows quite a difference in stack shape from RF scan 8 although the currents are practically the same.

Comments on vacuum

VG 665 recorded together with the beam current. Above 2.5 A there is an effect of the beam on the pressure, the pressure increase being closely related to the current, and not to history or the rate of current change. On two occasions a slow increase of pressure was observed with stable currents near 4 A : in one of these cases (after RF scan 8) the pressure increased from 10^{-9} to 3×10^{-9} torr within 2 minutes, (Fig. 5). It remained at the high level after RF scan 9. VG 665 was not at the worst vacuum during this run.

Beam-beam effect

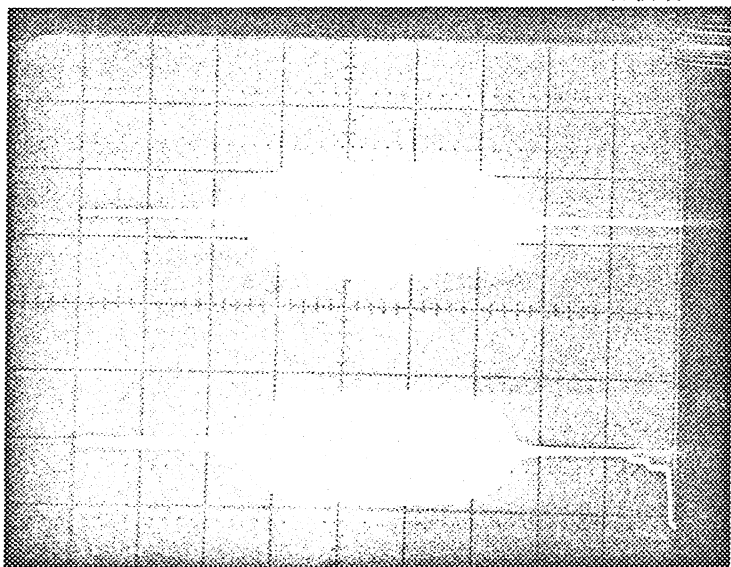
This was seen on the last stack when repetitive injection and acceleration started in Ring 2 (Fig. 6).

E. Keil

Distribution

Running In Committee
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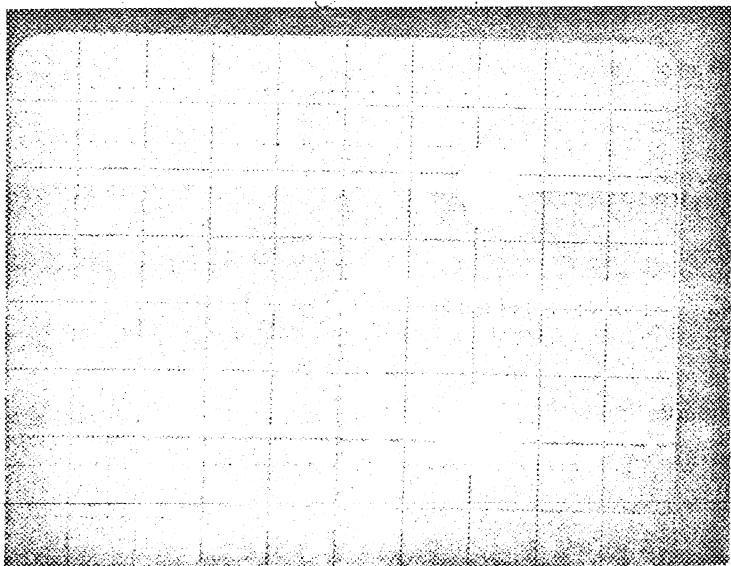
Scan 1



Scan 1

Run 64

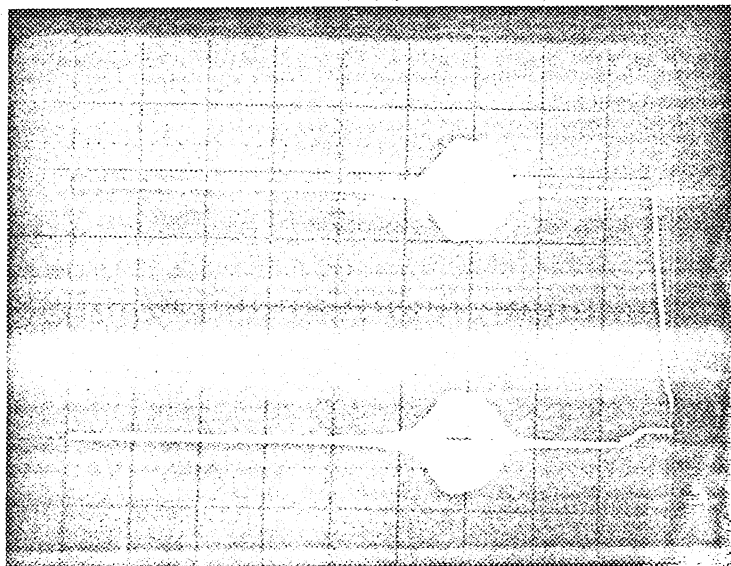
4B 012A Scan 2



Scan 2

2 runs 4B 012A RUN 64

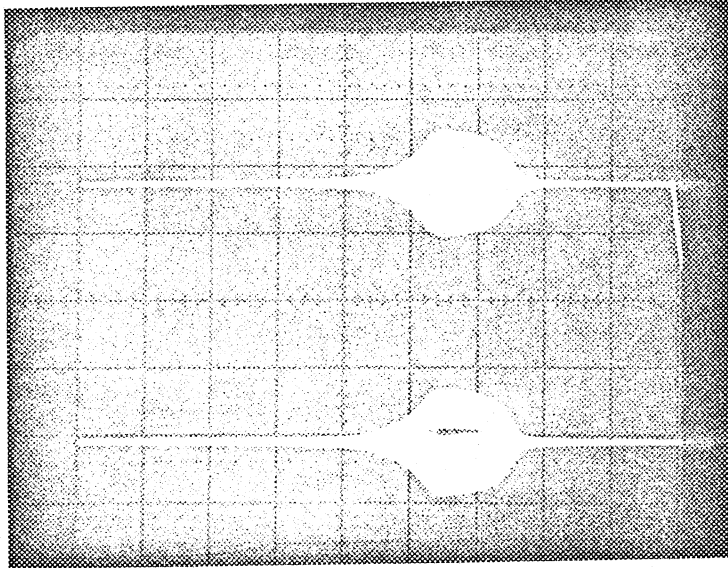
4B 04A Scan 3



Scan 3

'0 4 runs RUN 64

4B 0,6 A Scan 4



Scan 4

Run 64

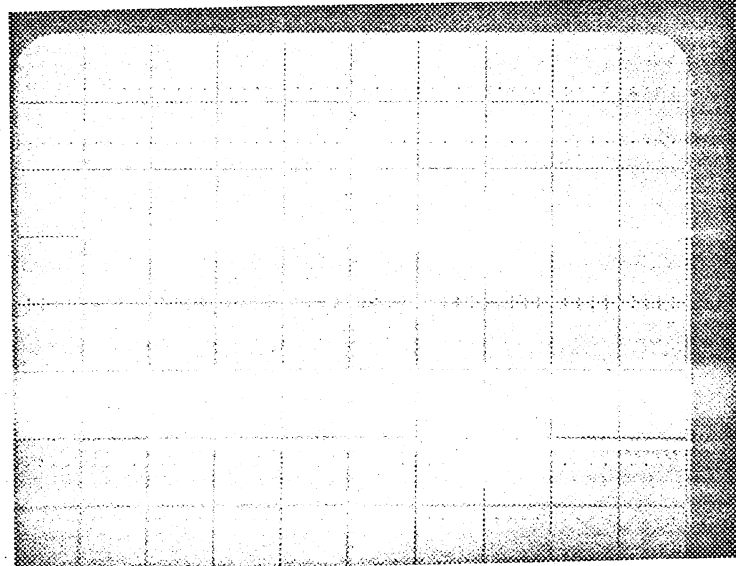
4B 1A Scan 5



Scan 5

Run 64

20 B 1A Scan 6

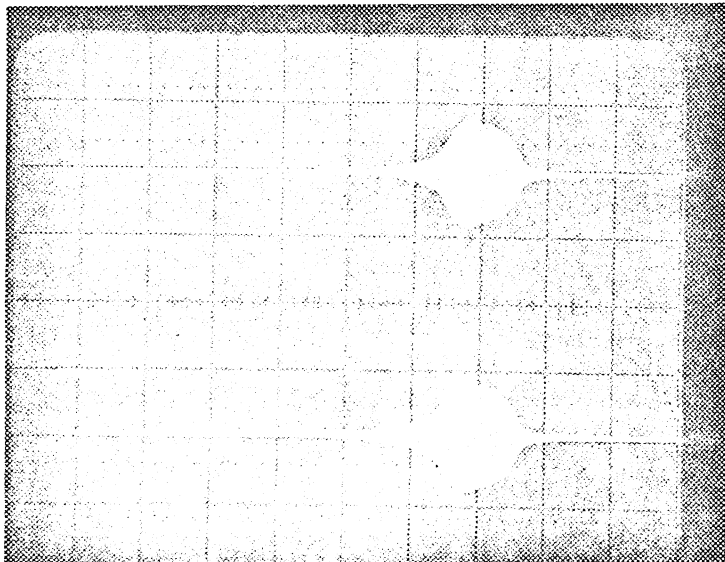


Scan 6

Gain x5 less than with 4B

Run 64

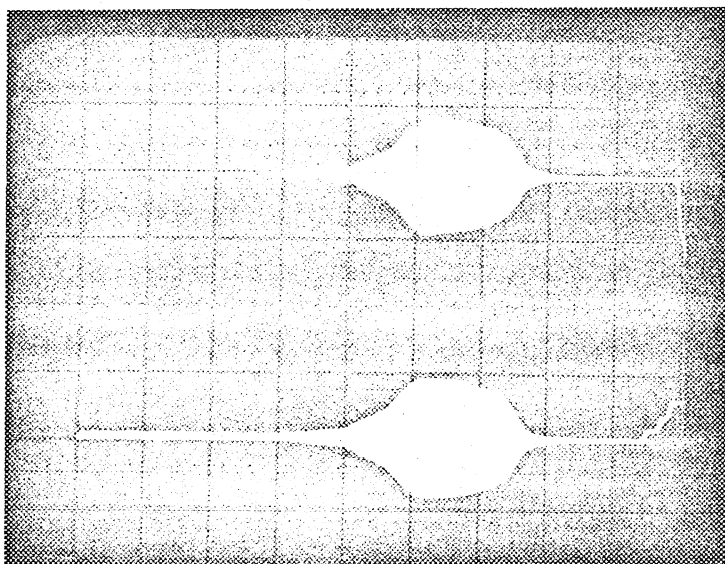
20B 2A Scan 7



Run 64

Scan 7

20B 4A Scan 8

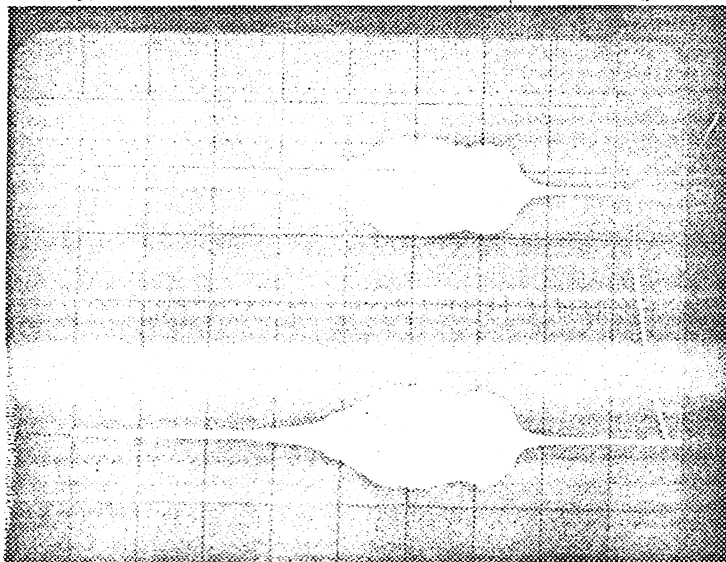


Run 64

Scan 8

Run 64

20B 41A Scan 9

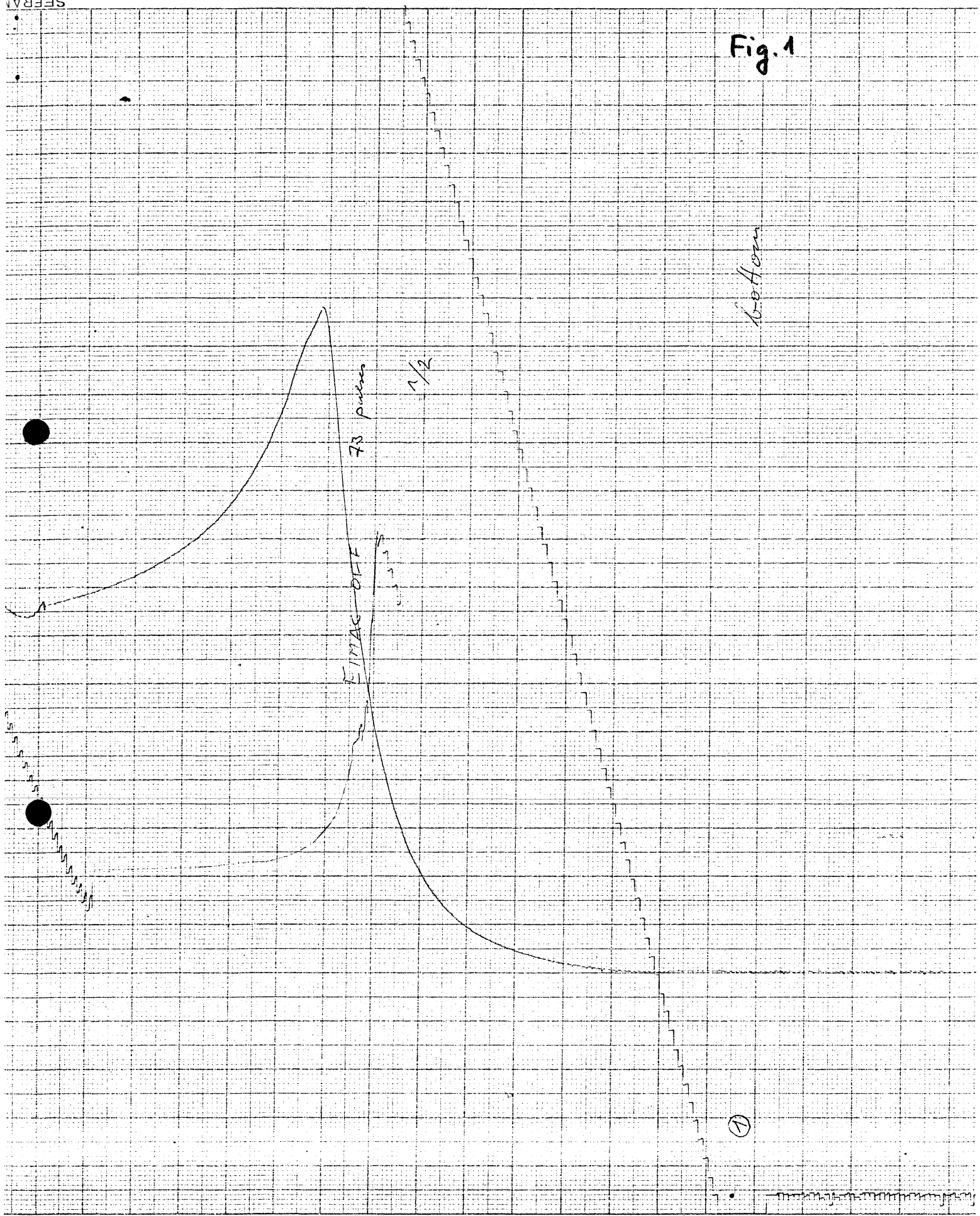


Run 64

Scan 9

~~Run 64~~

Fig. 1



Bottom

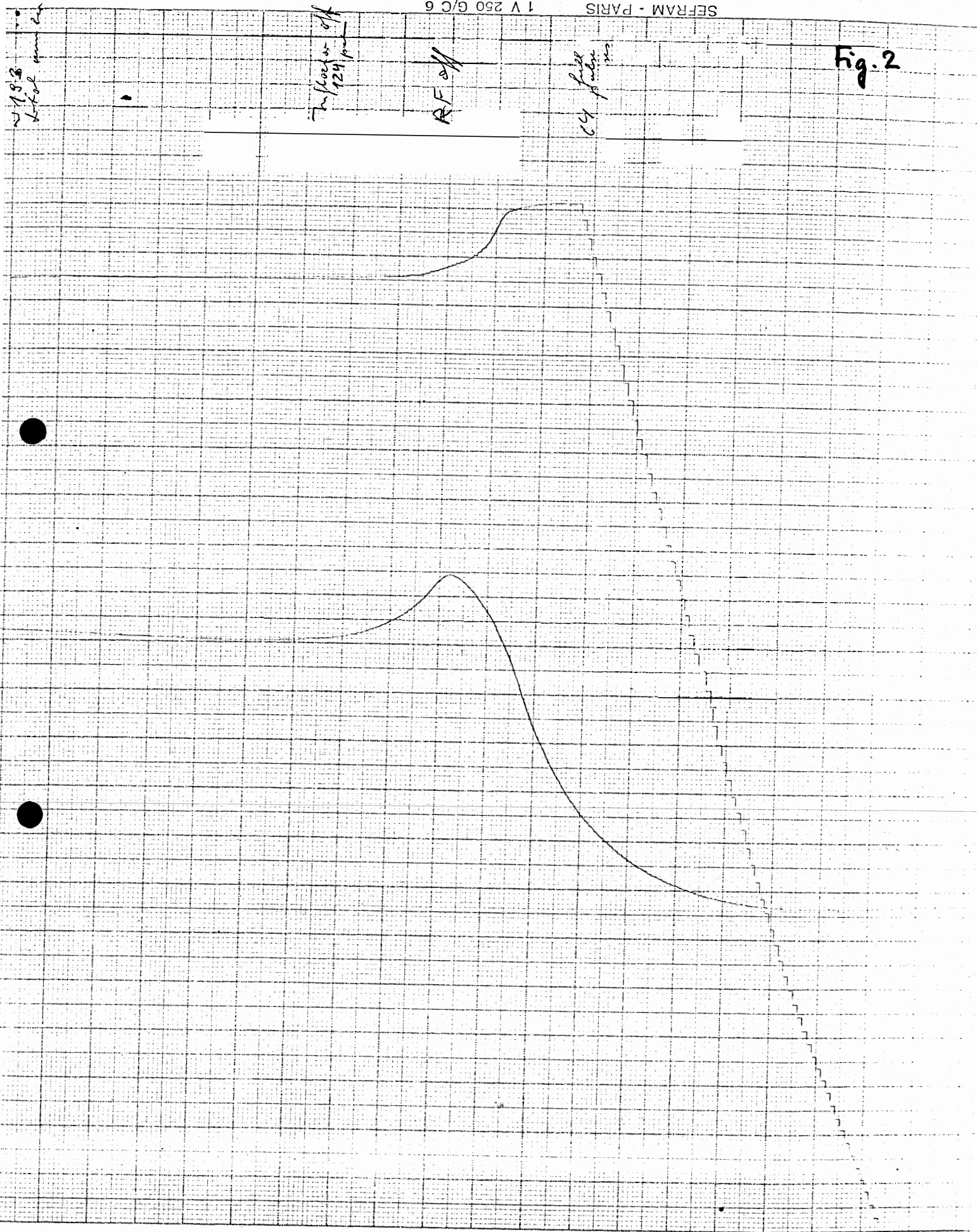
75 pulses

EMAC-DIE

1/2

①

Fig. 2



1198
Detail from Fig. 1

Tm 124/124

RF on

CC full pulse

RF on again
by 1000
shuts off

2500

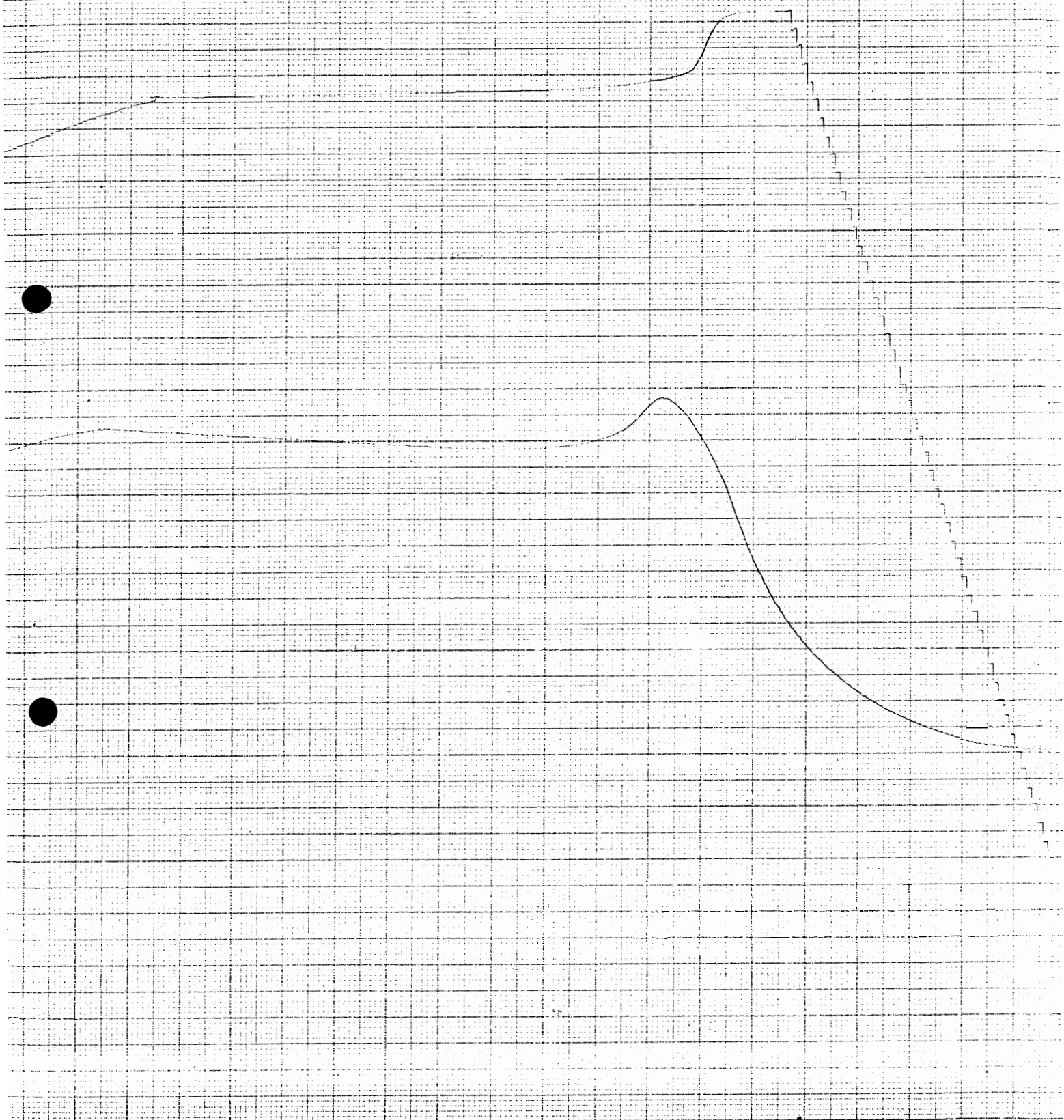
1000

1000

1000

Fluorescence
63 pulses

Fig. 3



RF Scan 1

141 pulses

1/1

1/2

Fig. 4

18/10

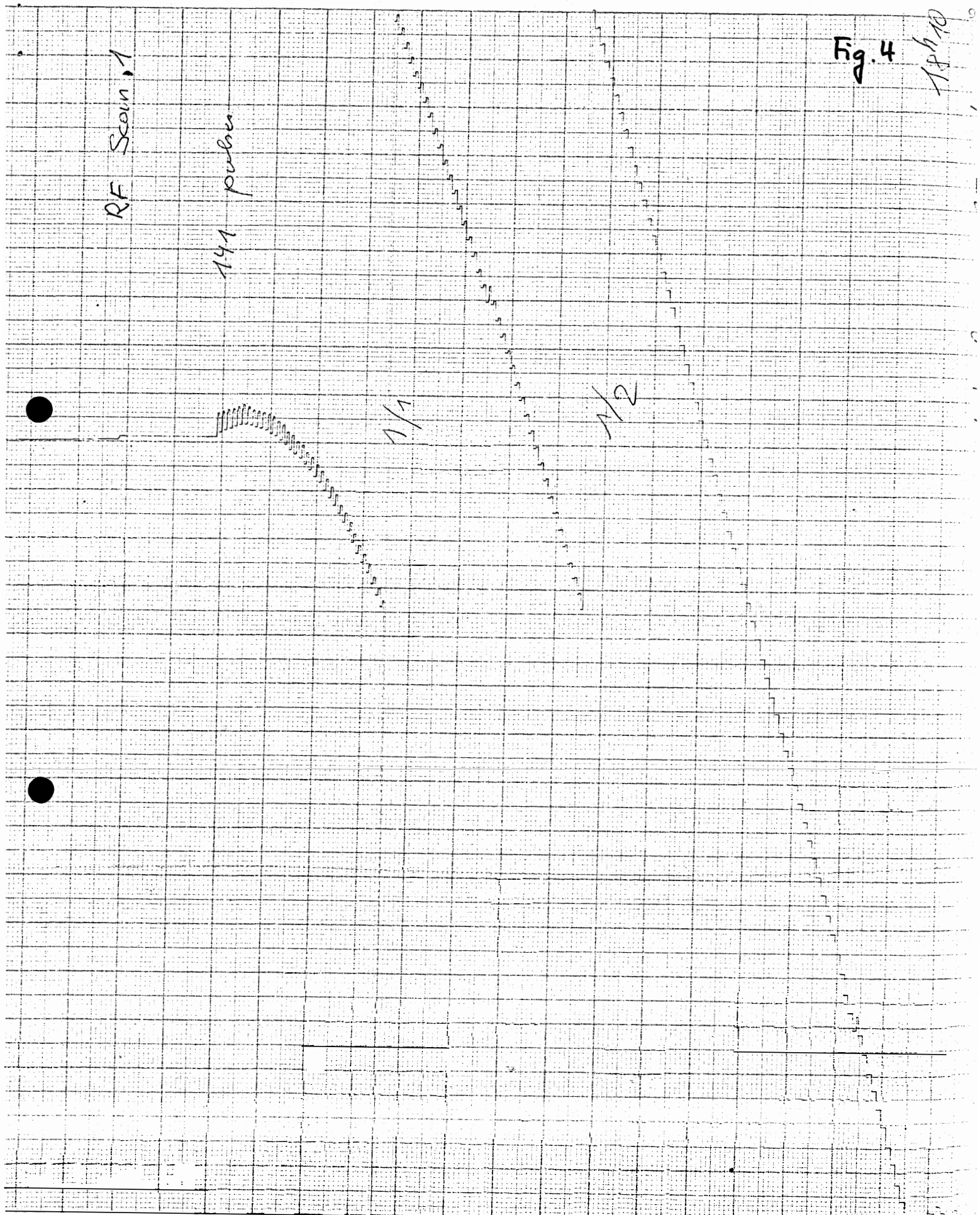
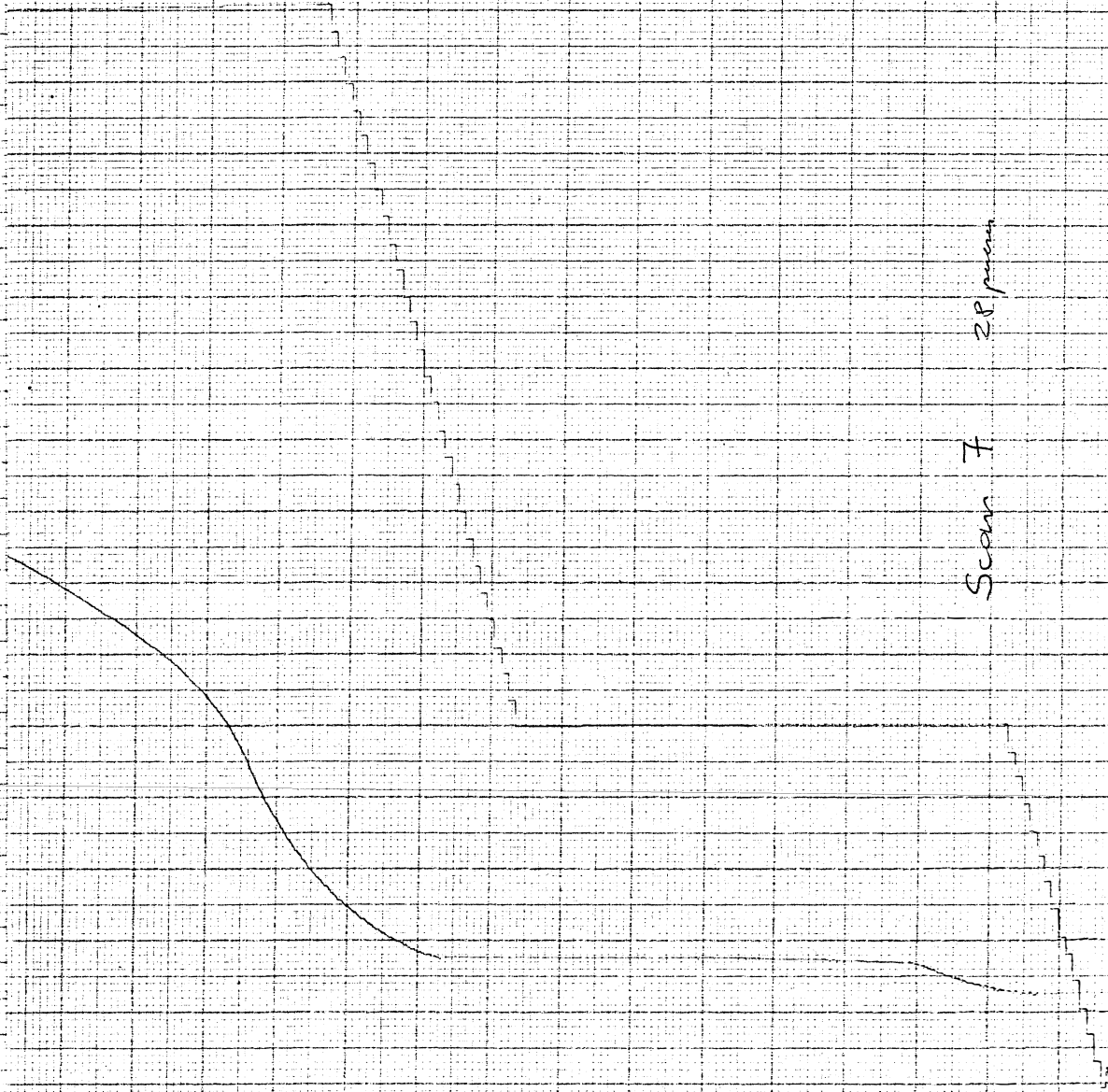


Fig. 5

Scan 8
5.5 μ m

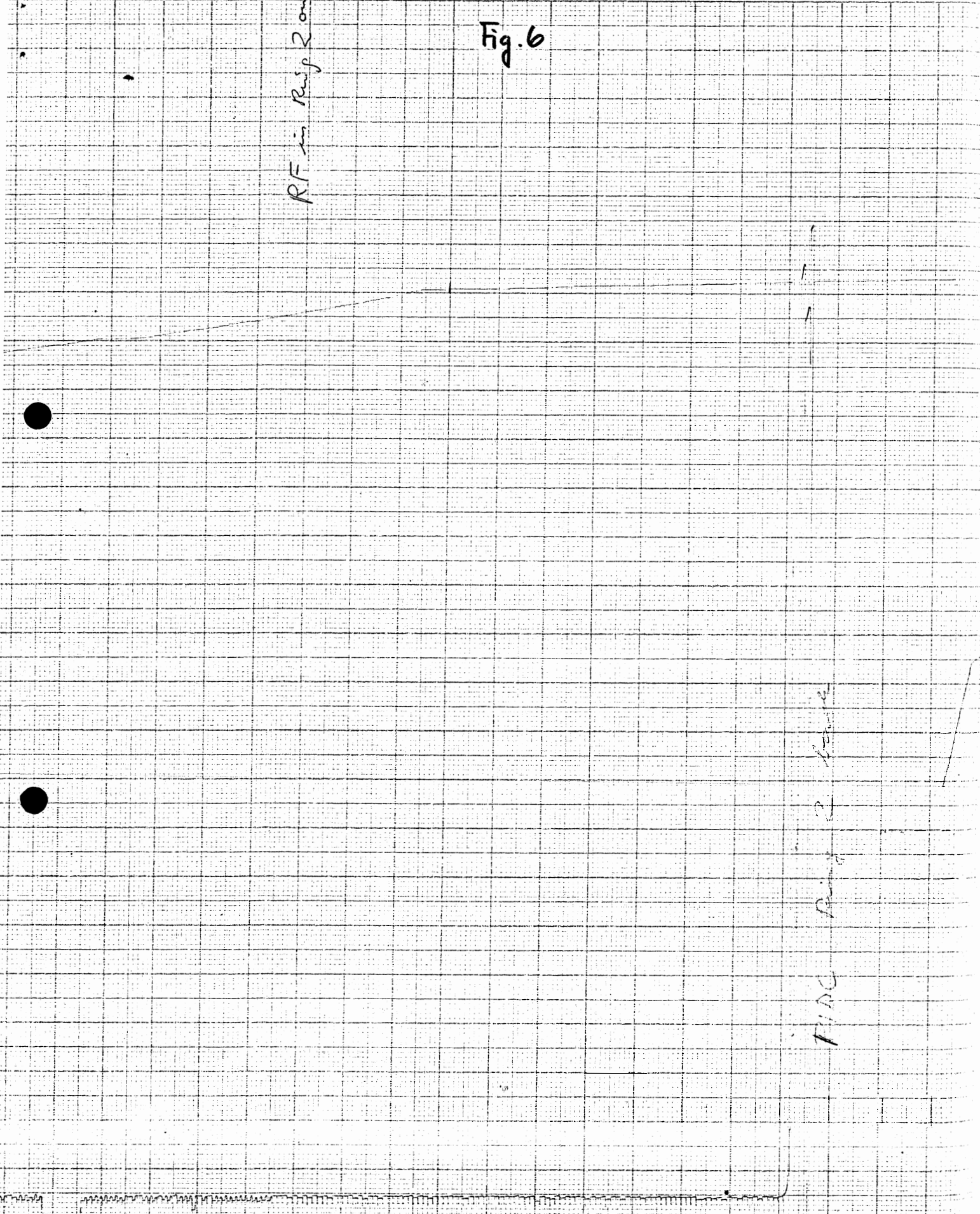


Scan 7
2.8 μ m

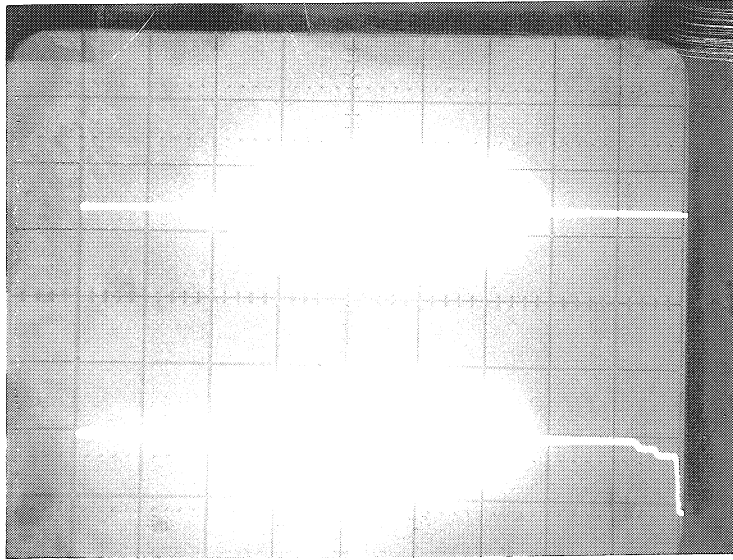
RF in Ruj 3 on

Fig. 6

TIME Point 2 1/2 sec



Scan 1



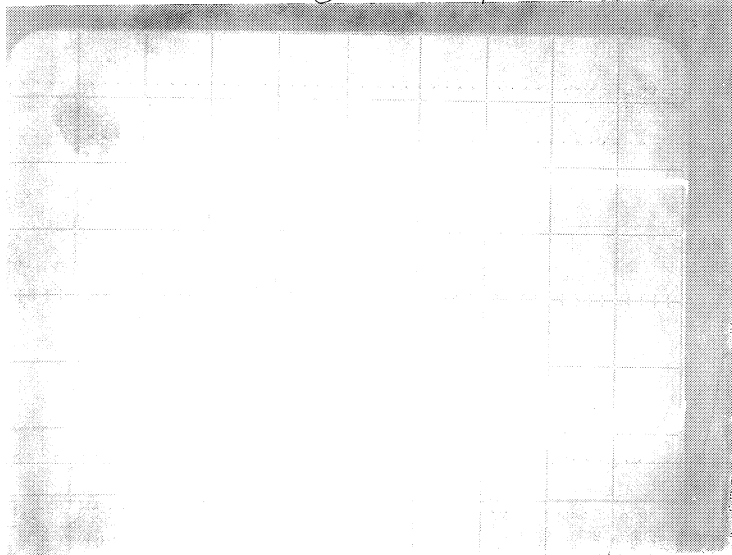
Scan 1

RUN 64

4B

0,2A

Scan 2



Scan 2

Scan 2

0,2A

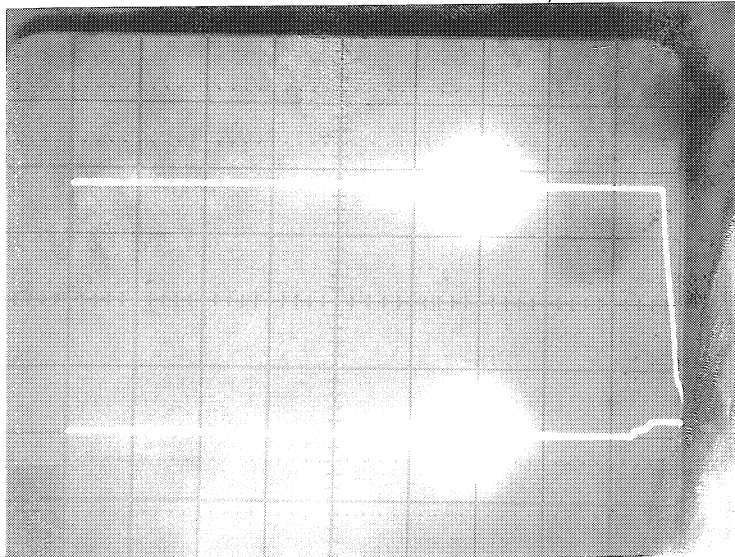
4 bundles

RUN 64

4B

0,4A

Scan 3



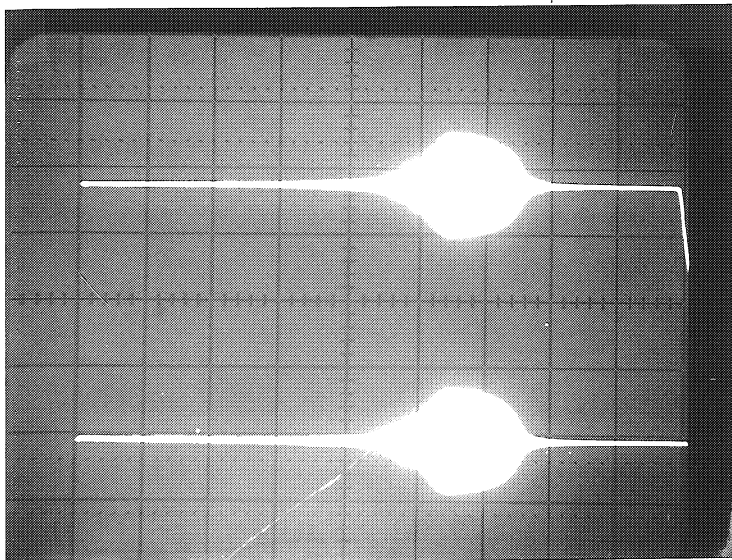
Scan 3

'0

4 bundles

RUN 64

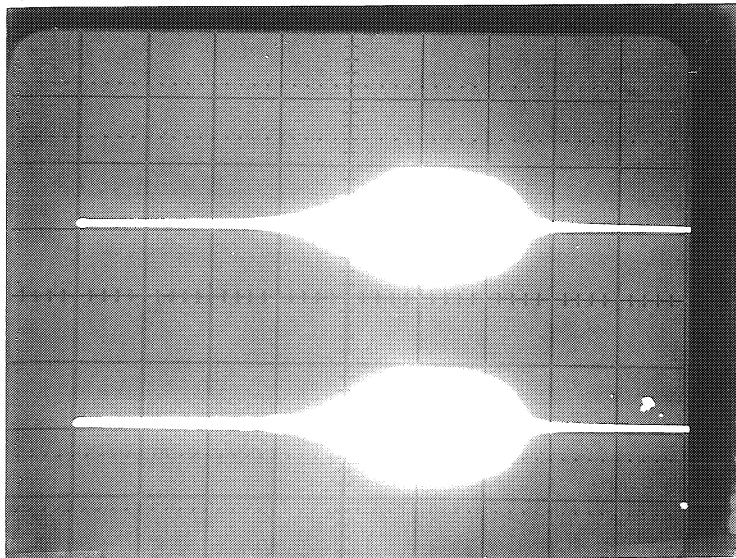
4B 0,6 A Scan 4



Scan 4

RUN 64

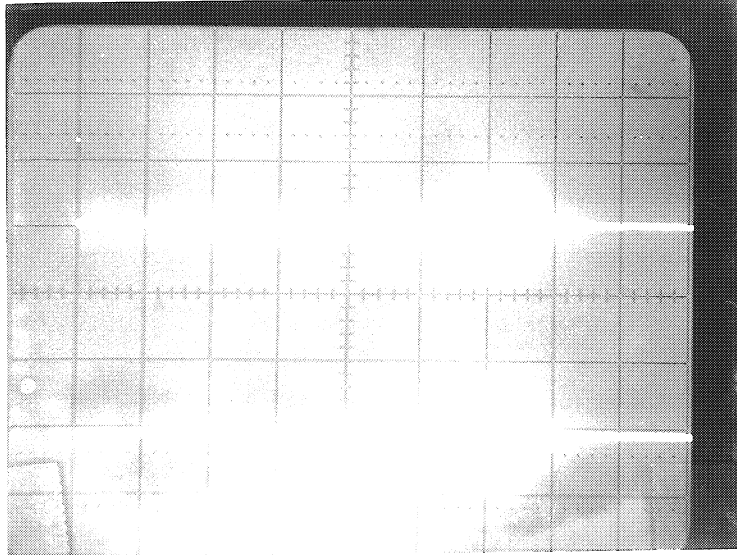
4B 1A Scan 5



Scan 5

RUN 64

20 B 1A Scan 6

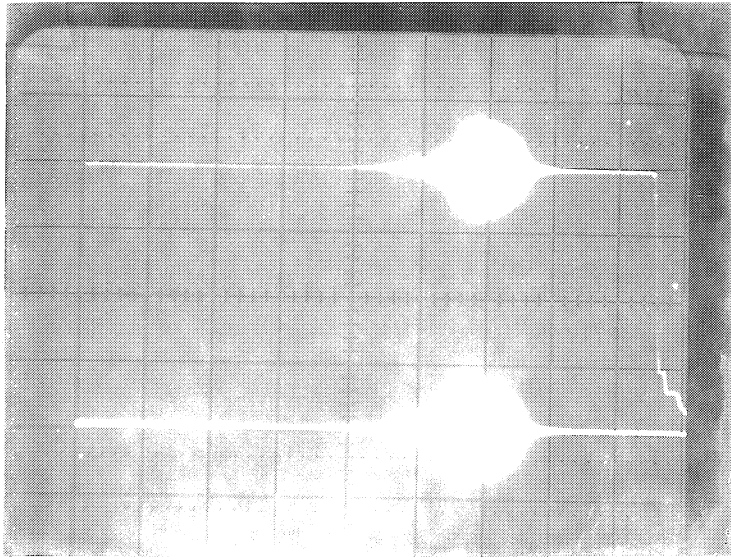


Scan 6

Gain x5 less than with 4B

RUN 64

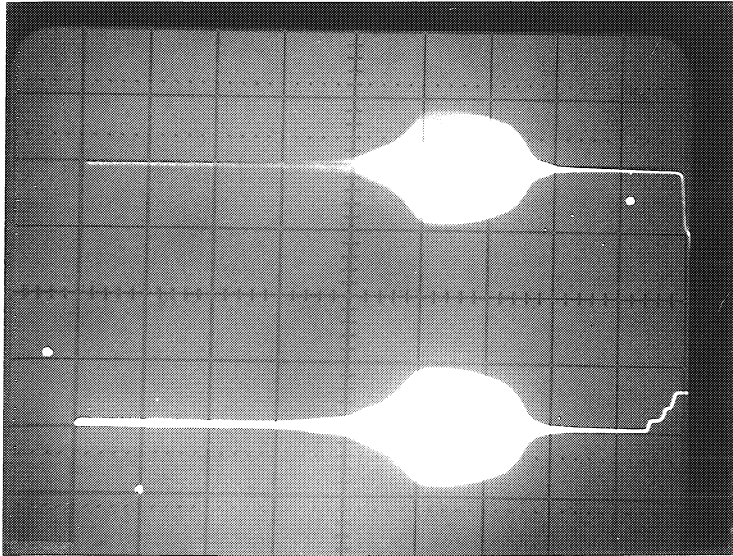
20B 2A Scan 7



Scan 7

Run 64

20B 4A Scan 8

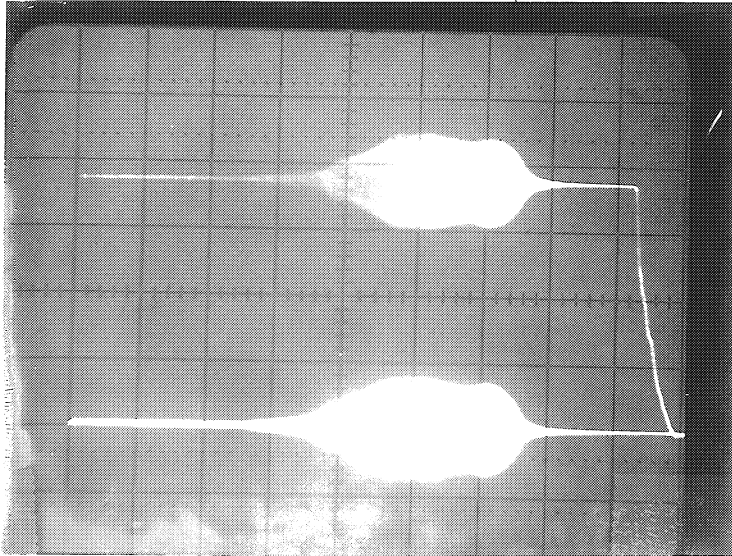


Scan 8

Run 64

Run 64

20B 4,1A Scan 9



Scan 9

Run 64

~~20B 4,1A Scan 9~~